

REMARKS

Applicant respectfully requests reconsideration and allowance of the subject application. Claims 1-25 are pending.

35 U.S.C. §112 Claim Rejections

The Office rejected claims 6-8, 12, 15, 17 and 21 under 35 U.S.C. § 112, second paragraph, as indefinite. With respect to claims 6-8, the Office indicated that the limitation “depth of the reflector” is vague because it is not clear what distance is the depth. The Office suggested that “thickness of the reflector” or “distance between the reflector and the radiating element” might be more appropriate language. Applicant agrees and has amended claims 6-8 accordingly to now recite the feature as a distance between the reflector and the radiating element. However, additional changes to the claim language were necessary in order to preserve the clarity of the claim. Particularly, as disclosed in the specification, the reflector can be, although certainly does not have to be, U-shaped. Accordingly, simply reciting the distance as a distance between “the reflector” and “the radiator” would be indefinite because the “distance” between the reflector and the radiator can be different for different parts of the reflector, especially if the reflector is U-shaped. The new language is believed to be sufficiently definite because it does not recite the overall shape of the reflector but merely recites that it has a planar surface parallel to the radiating element and that the distance at issue is the distance between those two surfaces.

Hence claims 6-8 should now be in acceptable form.

With respect to claims 12, 15, 17 and 21, the Office asserted that the limitation “said antenna” is vague because it is not clear to which antenna this limitation refers.

Again, the Office’s point is well taken. Applicant has amended the claims to recite “said multi-band antenna”. In effecting this Amendment, Applicant has noted that the preambles of the dependent claims should be changed in order to recite “a multi-band antenna” rather than simply “an antenna” in order to preserve the linguistic distinction between the various antennas recited in the claims throughout the claims. Specifically, there are three antennas recited in the various claims, namely, the “multi-band antenna,” a “first slot antenna,” and a “second slot antenna.”

35 U.S.C. §102(e) Claim Rejections

The Office rejected claims 1-2, 4-5, 10-15 and 17 of the 35 U.S.C. §102(e) as anticipated by Sabet.

The Claimed Invention

The claimed invention is a multi-band antenna that operates in both the PCS band and the AMPS band. The antenna comprises two slot antenna elements, a transmission line to feed the slot antennas, and a reflector element. The antenna design allows the reflector element to be positioned one-sixth of a PCS band wavelength and one-thirteenth of an AMPS wavelength from the radiating elements. Configuring the antenna using a reflector and such an electrically short cavity allows the antenna to be compact enough to be mounted to the top of a front windshield in a vehicle without interfering with visibility, while at the same time preventing radiation from entering into the passenger compartment of the vehicle.

The Sabet Reference

Sabet discloses a multifunction printed antenna with GPS in which satellite radio patch antenna elements are printed on one side of the printed circuit board and AMPS, PCS, GSM, and terrestrial radio slot antennas are etched in a ground plane on an opposite side of the same printed circuit board.

Sabet Does Not Anticipate Claims 1-2, 4-5, 10-15 and 17

The Office asserted that Figures 1 and 4 of Sabet disclose first and second slot antennas 32, 34 operating in the PCS and the AMPS frequency band, a reflector 16 to be coupled to the antennas, and transmission lines 38, 40 to feed the first and second slot antennas.

This is erroneous. Sabet does not disclose a reflector. Element 16 is a ground plane. See column 1, lines 57-61 and column 4, lines 38-52. Ground plane 16 is the surface into which the antennas 32, 34 are etched. See column 1, lines 60-61. Since claim 1 recites a reflector, said reflector coupled to said radiating element, it is not anticipated by Sabet, which does not disclose a reflector.

Since claims 2, 4-5, 10-15, and 17 depend from claim 1, they also cannot be anticipated by Sabet.

Even further, some of the dependent claims add even further distinguishing features. For instance, claim 4 adds that “the radiating element further comprises a GPS patch antenna.” The Office asserted that a GPS patch antenna is shown as 298 in Figure 19 of Sabet. While Sabet discloses that element 298 is a GPS antenna, Sabet does not meet the limitations of claim 4 because claim 4 recites that the GPS antenna is part of the previously claimed radiating element that also contains the two slot antennas. In Sabet, antenna 298 is not part of the radiating

element containing the other two antennas. Rather, it is a separate component on a separate substrate 296. Accordingly, claim 4 even further distinguishes over Sabet.

With respect to dependent claim 5, which recites that the reflector is generally rectangular, it obviously is not met by Sabet since Sabet does not disclose a reflector. Accordingly, dependent claim 5 even further distinguishes over Sabet.

Accordingly, claims 1-2, 4-5, 10-15, and 17 patently distinguish over Sabet.

35 U.S.C. §103 Rejection

The Office further rejected claims 6-9, 16, and 18-25 under 35 U.S.C. §103(a) as unpatentable over Sabet in view of Wiesbeck.

These claims distinguish over the proposed combination of Sabet and Wiesbeck at least for the reasons discussed above as to how claim 1, from which they all depend, distinguishes over Sabet. The sole reason for the citation of Wiesbeck provided in the Office Action is in connection with claims 6-8, which recite specific distances between the reflector and the radiating element. Wiesbeck does not provide the above-described teachings lacking from Sabet with respect to claim 1.

Even further, however, the Office asserted that Wiesbeck discloses the depth of a reflector beam between .758 inch and 1.25 inch, the depth of the reflector being a maximum of the one-sixth of one wavelength for a signal in the PCS beam, and the depth of the reflector being a maximum of one-thirteenth of a wavelength of a signal in the AMPS band for improved antenna performance. Applicant has reviewed the Wiesbeck reference and has not located any disclosure of the distance between the reflector and the radiating elements other than the statement that the

separating distance “is set to suit the frequency range.” Certainly that vague statement does not meet the limitations of claims 6-8. If the Office believes that applicant has misunderstood the Wiesbeck reference and that it does, in fact, disclose the claimed distances, Applicant respectfully requests the Office to specifically identify the support in the Wiesbeck reference so that Applicant may more specifically address this rejection.

Accordingly, dependent claims 6-8 even further distinguish over the prior art of record.

With respect to claims 9, 16 and 18-25, Applicant respectfully traverses the rejection on the grounds that the rejections are unclear. Specifically, with respect to all of those claims, the Office has simply asserted that Sabet meets those limitations. However, the Office has not indicated where those limitations are found in Sabet. Furthermore, all of those claims depend from either claim 1 or claim 4, which have been rejected as anticipated by Sabet. Accordingly, the Office appears to be relying solely on the Sabet reference in the rejections of claims 9, 16 and 18-25., without mentioning the Wiesbeck reference. Yet, the beginning paragraph of these rejections purports to be a rejection based on Sabet AND Wiesbeck. Applicant respectfully requests that these rejections be withdrawn or further explained, including (1) an explanation of the references upon which the rejections are based and (2) where in those references the recited claim elements are allegedly found.

Finally, the Office rejected claim 3 under 35 U.S.C. §103(a) as unpatentable over Sabet in view of Eason. Claim 3 recites that the printed circuit board is formed

of FR4. The Office concedes that Sabet does not disclose FR4, but cites Eason as disclosing the use of FR4 for the slot antenna.

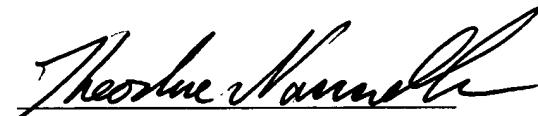
Regardless of whether or not Eason discloses FR4, it does not disclose a reflector as claimed in claim 1 and which is lacking from the primary, Sabet reference, as discussed above in connection with claim 1. Accordingly, claim 3 patently distinguishes over the proposed combination of Sabet and Eason at least for all of the reasons discussed above in claim 1.

Conclusion

In view of the foregoing amendments and remarks, this application is now in condition for allowance. Applicant respectfully requests the Examiner to issue a Notice of Allowance at the earliest possible date. The Examiner is invited to contact Applicant's undersigned counsel by telephone call in order to further the prosecution of this case in any way.

Respectfully Submitted,

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